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EXAMINER	
MCNELIS, KATHLEEN A	
ART UNIT	PAPER NUMBER
1742	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/718,961	BAMPTON, CLIFFORD C.	
	Examiner	Art Unit	
	Kathleen A. McNelis	1742	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 May 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-7,9-15,17-20 and 24* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7,9-15,17-20 and 24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

This action is pursuant to the 05/21/2007 Pre-appeal panel decision.

Claims Status

Claims 1-7, 9-15, 17-20 and 24 remain for examination.

Status of Previous Rejections

Upon reconsideration, the finality of the previous rejection is withdrawn.

The following rejections are maintained:

- Claims 1, 2, 9 and 10 under 35 U.S.C. 102(b) as anticipated by Abbott et al. (AeroMet implementing novel Ti process, 1998) or, in the alternative, under 35 U.S.C. 103(a) as obvious over Abbott et al. (AeroMet implementing novel Ti process, 1998).

The following rejections are withdrawn in view of arguments:

- Claims 20 and 24 under 35 U.S.C. 102(b) as anticipated by Abbott et al. (AeroMet implementing novel Ti process, 1998) or, in the alternative, under 35 U.S.C. 103(a) as obvious over Abbott et al. (AeroMet implementing novel Ti process, 1998). Examiner agrees that Abbot et al. does not disclose a Ti-Cu-Ni alloy as recited in claim 20,
- Claims 1, 2, 9, 10, 20 and 24 under 35 U.S.C. 103(a) as obvious over Abbott et al. (AeroMet implementing novel Ti process, 1998) in view of Ryan (U.S. Pat. No. 4,725,509) or Blue et al. (1996) or Zhuang et al. (1997). While Ryan, Blue et al. and Zhuang et al. disclose the use of the Ti-Cu-Ni alloy, they do not suggest the use of only about 10 to 30 wt% of such alloy,
- Claims 4, 5, 7, 12, 13 and 15 under 35 U.S.C. 103(a) as obvious over Abbott et al. (AeroMet implementing novel Ti process, 1998) in view of Blue et al. (1996) as applied to claims 1 and 9,
- Claims 6 and 14 under 35 U.S.C. 103(a) as obvious over Abbott et al. (AeroMet implementing novel Ti process, 1998) in view of Blue et al. (1996) or Zhuang et al. (1997) as applied to claims 1 and 9,

- Claim 17 under 35 U.S.C. 103(a) as obvious over Abbott et al. (AeroMet implementing novel Ti process, 1998) alone or in view of Ryan (U.S. Pat. No. 4,725,509) or Blue et al. (1996) or Zhuang et al. (1997) as applied to claim 9 and in further view of Marcus et al. (U.S. Pat. No. 5,182,170),
- Claim 18 under 35 U.S.C. 103(a) as obvious over Abbott et al. (AeroMet implementing novel Ti process, 1998) alone or in view of Ryan (U.S. Pat. No. 4,725,509) or Blue et al. (1996) or Zhuang et al. (1997) as applied to claim 9 and in further view of Das et al. (1999),
- Claims 3 and 11 under 35 U.S.C. 103(a) as obvious over Abbott et al. (AeroMet implementing novel Ti process, 1998) alone or in view of Ryan (U.S. Pat. No. 4,725,509) or Blue et al. (1996) or Zhuang et al. (1997), and
- Claims 18 and 19 under 35 U.S.C. 103(a) as obvious over Abbott et al. (AeroMet implementing novel Ti process, 1998) alone or in view of Ryan (U.S. Pat. No. 4,725,509) or Blue et al. (1996) or Zhuang et al. (1997).

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 6, 7, 14, 15, 20 and 24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 6, 14 and 20 recite an alloy composition comprising 15% Ni and 15% Cu but do not specify if this is volume or weight percent. For examination purposes, wt% has been assumed.

Claim Rejections - 35 USC § 102

> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 1, 2, 9 and 10 are rejected under 35 U.S.C. 102(b) as anticipated by Abbott et al. (AeroMet implementing novel Ti process, 1998) or, in the alternative, under 35 U.S.C. 103(a) as obvious over Abbott et al. (AeroMet implementing novel Ti process, 1998).

Abbott et al. is applied as discussed in the 07/25/2006 Office action.

Claims 1, 2, 6, 9, 10, 14, 20 and 24 are rejected under 35 U.S.C. 103(a) as obvious over Abbott et al. (AeroMet implementing novel Ti process, 1998) in view of Clement et al. (U.S. Pat. No. 6,223,976)

With respect to claims 1, 6, 9, 14, 20 and 24, Abbott et al. discloses a process for laser based direct metal deposition combining cladding and rapid prototyping technologies, similar to selective laser sintering, where metal powder is deposited onto a substrate and melted to build fully dense material (p. 24). Abbott et al. discloses depositing Ti-6Al-4V and Ti-5Al-2.5Sn alloys and teaches that precursor powder can be in either elemental or pre-alloyed form (p. 25). Abbott et al. discloses that the method can be beneficially used to add material for repairing worn surfaces of such articles as tools, molds and dies by deposition of additional material (p. 26).

Abbott et al. does not recite the use of carbon-based polymer in the process. Further, such would not be expected in or added to Abbott et al., since Abbott et al. does not disclose using a binder.

Abbott et al. does not recite the inclusion of between about 10 wt% and about 30 wt% of a Ti-Cu-Ni alloy having about 15% Cu and 15% Ni (claims 6, 14 and 20).

Clement et al. discloses a process for repairing and refacing titanium aluminide articles by preparing a mixture of powders (blend) consisting of 40-90% powder A and 10-40% powder B (abstract). Clement et al. teaches that powder A is the same composition as the article to be refaced or repaired whereas powder B is Cu15 Ni15 balance Ti (e.g. example 2 col. 4 lines 13-59). An obvious advantage of the addition of the Ti-15Cu-15Ni alloy is the lower melting temperature of the Ti-15Cu-15Ni alloy relative to both the alloys disclosed in Clement et al. and the Ti-6Al-4V alloy of Abbot et al. This feature would enable repair and refacing to be made at a temperature lower than that of the article to be repaired. It would have been obvious to one of ordinary skill in the art at the time the invention was made to add between 10 and 40% of Ti-15Cu-15Ni as taught by Clement et al. to the Ti-6Al-4V composition of Abbott et al. to enable deposition to be made at lower temperatures as suggested by Clement et al.

With respect to claims 2 and 10, Abbott et al. discloses the use of an alloy containing tin (p. 25).

Claims 2, 3, 10 and 11 are rejected under 35 U.S.C. 103(a) as obvious over Abbott et al. (AeroMet implementing novel Ti process, 1998) alone or in view of Clement et al. (U.S. Pat. No. 6,223,976) as applied to claims 1 and 9 and further in view of Rongti (2001).

Abbot et al. alone or in view of Clement et al. is applied as discussed above regarding claims 1 and 9.

Abbot et al. alone or in view of Clement et al. does not disclose that the addition of between 5 and 15 wt% of tin.

Rongti et al discloses that tin addition to Ti can improve the wetting behavior of Ti on substrates and discloses a composition of 10% tin (pp. 21 and 24). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a 10% tin composition as

taught by Rongti et al. in the powder composition of Abbott et al. alone or in view of Clement et al. to improve wetting as taught by Rongti et al.

Claims 4, 5, 7 and 15 are rejected under 35 U.S.C. 103(a) as obvious over Abbott et al. (AeroMet implementing novel Ti process, 1998) in view of Clement et al. (U.S. Pat. No. 6,223,976) as applied to claims 1, 6, 9 and 14 and further in view of Blue et al. (1996).

Abbott et al. in view of Clement et al. is applied as discussed above regarding claims 1, 6, 9 and 14.

Blue et al. discloses the use of filler alloys including Ti-15Cu-15Ni (p. 4014) and teaches that the temperature is a result effective variable, which affects the time necessary for solidification and homogenization (pp. 4012-4013). It would have been obvious to one of ordinary skill in the art at the time the time the invention was made to adjust the temperature as a result-effective variable as taught by Blue et al to affect the solidification and homogenization time in Abbott et al. in view of Clement et al. (see M.P.E.P 2144.05, II, B).

Claims 12 and 13 are rejected under 35 U.S.C. 103(a) as obvious over Abbott et al. (AeroMet implementing novel Ti process, 1998) alone or in view of Clement et al. (U.S. Pat. No. 6,223,976) and Rongti (2001) as applied to claim 11 and further in view of Blue et al. (1996).

Abbott et al. in view of Clement and Rongti is applied as discussed above regarding claim 11.

Abbot et al. in view of Clement and Rongti does not disclose heating to a temperature of less than about 1700 °F (claims 4, 7, 12 and 15) or about 449 °F (claims 5 and 13)

Blue et al. discloses the use of filler alloys including Ti-15Cu-15Ni (p. 4014) and teaches that the temperature is a result effective variable, which affects the time necessary for solidification and homogenization (pp. 4012-4013). It would have been obvious to one of

ordinary skill in the art at the time the time the invention was made to adjust the temperature as a result-effective variable as taught by Blue et al. to affect the solidification and homogenization time in Abbot et al. in view of Clement and Rongti (see M.P.E.P 2144.05, II, B).

Claim 17 is rejected under 35 U.S.C. 103(a) as obvious over Abbott et al. (AeroMet implementing novel Ti process, 1998) in view of Clement et al. (U.S. Pat. No. 6,223,976) as applied to claim 9 and further in view of Marcus et al. (U.S. Pat. No. 5,182,170).

Abbott et al. in view of Clement et al. is applied as discussed above regarding claim 9.

Abbott et al. in view of Clement et al. does not disclose that each powder blend layer is between about 0.01 inch to 0.002 inch thickness.

Marcus et al. discloses a method for using selective laser sintering to build layers (abstract) wherein powder thickness of 0.005 inches for a given layer (col. 10 lines 6-27), which is within the disclosed range of between 0.01 and 0.002 inch (claim 17). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a thickness of 0.005 inches as taught by Marcus et al. in the process of Abbott et al. in view of Clement et al. since the processes are similar and produce similar products, since Abbott et al. in view of Clement et al. is silent regarding powder thickness, and since Marcus et al. discloses that the invention can produce almost any three dimensional part (col. 3 lines 30-45).

Claim 18 is rejected under 35 U.S.C. 103(a) as obvious over Abbott et al. (AeroMet implementing novel Ti process, 1998) in view of Clement et al. (U.S. Pat. No. 6,223,976) as applied to claim 9 and in further view of Das et al. (1999).

Abbott et al. in view of Clement et al. is applied as discussed above regarding claim 9.

Abbott et al. in view of Clement et al. does not disclose that HIP is performed following liquid phase sintering and isothermal solidification as in instant claim 18.

Das et al. discloses a method for producing titanium alloys by selective laser sintering followed by hot isostatic processing (abstract). Das et al. teaches that the combined method allows for freeform shaping capability and production of fully dense metal parts (p. 116). It would have been obvious to one of ordinary skill in the art at the time the invention was made incorporate the HIP process of Das et al. into the process of Abbott et al. in view of Clement et al. to produce fully dense parts as taught by Das et al. and as desired in Abbott et al. in view of Clement et al.

Claims 18 and 19 are rejected under 35 U.S.C. 103(a) as obvious over Abbott et al. (AeroMet implementing novel Ti process, 1998) in view of Clement et al. (U.S. Pat. No. 6,223,976) as applied to claim 9 and in further view of Huang (U.S. Pat. No. 6,042,780).

Abbott et al. in view of Clement et al. is applied as discussed above regarding claim 9

Abbott et al. in view of Clement et al. does not disclose that HIP is performed following liquid phase sintering and isothermal solidification as in instant claim 18, or that the pressure is about 1500 psi at temperature of 1800 °F as in instant claim 19.

Huang discloses a method for hot isostatic pressing (abstract) materials produced by selective laser sintering (col. 1 lines 49-53) or coatings (col. 8 lines 11-16), at a temperature not exceeding 1800 °C (col. 13 lines 23-26) at pressures as high as 1 GPa (col. 12 lines 25-31). Huang discloses processing Ti-6Al-4V powder in an inert (argon) atmosphere (col. 11 lines 52-59). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the HIP process of Huang to further density the SLS parts or coatings of Abbott et al. in view of Clement et al. since the method of Huang excludes air and contaminants (abstract) and densification is desired in Abbott et al. in view of Clement et al. The temperature range of not more than 1800 °C overlaps the claimed range of about 1800 °F. It would have been obvious to

one of ordinary skill in the art to perform the HIP at a temperature of about 1800 °F, since Huang discloses that any temperature in the range not exceeding 1800 °C has utility for HIP. The range of 1 GPa overlaps the claimed range of about 1500 psi (about 10 MPa). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a pressure of 10 MPa, since Huang discloses equal utility for up to 1 GPa.

Response to Arguments

Applicant's arguments filed 04/25/2007 regarding claims 1, 2, 9 and 10 have been fully considered but they are not persuasive.

Arguments are summarized as follows:

1. AeroMet clearly fails to teach or suggest a method in which a powder blend is spread into a layer on a substrate and then a laser is directed onto selected areas of the layer of powder.
2. AeroMet discloses the use of a 6% Al, 4%V balance Ti (wt%) powder but does not teach or suggest that either Al or V is quantitatively added in a manner whereby the Ti will dissolve in but not react with molten Al or V at a particular annealing temperature. The presence of a Ti-Al alloy seems to suggest the opposite of what is presently claimed, namely that the elements are selected based on the base metal dissolving but not reacting with a powder blend.
3. The instant invention claims that the alloying metal is re-solidified and thereby binds the base metal whereas AeroMet discloses melting the powder in its entirety. In the instant invention the term bind is considered securing in place and not a reaction.

Examiner's responses are as follows:

1. Abbott (Aeromet recites:

> **In its simplest form, a laser beam is focused onto a metal substrate to create a molten pool. Deposition material, in the form of metal wire or powder, is fed into the pool, resulting in the net build up of fully dense material. The substrate is moved under the laser beam by a computer controlled multi-axis positioning system, and a 2-D slice of the part is created. Once one layer has been completed, the positioning system is incremented in the vertical direction, and the next layer is deposited on the previous one. These steps are repeated until the part is complete.**

Layers are built incrementally by deposition of metal powder. The laser beam is an energy beam. By moving the substrate, the laser beam contacts selected areas. The instant claims do not contain the language "and then" "laser" or "substrate" as argued. As recited, the instant claims do not require any specific sequence for performing the process. Further, the instant claims do not require that the powder be in solid form when applied to the platform, or prohibit a melt pool on the platform. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

2. AeroMet discloses a Ti-6Al-4V alloy. This is a defined quantitative composition having known physical properties as evidenced by the ASM and Physical Metallurgy Principles references already of record and as discussed in the 04/02/2007 advisory action. Figure 20.19 of Physical Metallurgy Principles shows temperature regions between the melting points of Al (about 660 °C) and Ti (about 1668 °C) can be selected, such as the β-Ti region, where reactions between elements do not occur. The word "alloy" is defined as (1) a substance having metallic properties and being composed of two or more chemical elements of which at least one is a metal, (2) to make or melt an alloy (Metals Handbook Desk edition, p. 5). It is unclear why the term "alloy" would suggest the opposite of the instant invention, especially since the instant invention appears to claim a Ti-Cu-Ni alloy (e.g. instant claim 6). Further, the limitation "but not reacting with the liquid alloying metal" appears to apply only as a characteristic of the alloy system at a temperature selected between the respective melting temperatures of the pure elements.

3. It is unclear why applicant considers this a difference, since instant claim 1 recites "melting said alloying metal" as well as "re-solidifying said alloying metal". Further, "binding" in the instant invention appears to be a result of the melting and re-solidification (claim 1 lines 14-17). If applicant is arguing that the instant invention only partially melts the alloy or melts only part of the alloy, such is not claimed.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kathleen A. McNelis whose telephone number is 571 272 3554. The examiner can normally be reached on M-F 8:00 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on 571-272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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07/14/2007

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